ABSTRACT OF THE DISCLOSURE

Auto focus systems and methods for a machine vision metrology and inspection system provide high speed and high precision auto focusing, while using relatively low-cost and flexible hardware. One aspect of various embodiments of the invention is that the portion of an image frame that is output by a camera is minimized for auto focus images, based on a reduced readout pixel set determined in conjunction with a desired region of interest. The reduced readout pixel set allows a maximized image acquisition rate, which in turn allows faster motion between auto focus image acquisition positions to achieve a desired auto focus precision at a corresponding auto focus execution speed that is approximately optimized in relation to a particular region of interest. In various embodiments, strobe illumination is used to further improve auto focus speed and accuracy. A method is provided for adapting and programming the various associated auto focus control parameters.